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Standards Quarterly Update:

What you need to know now for the future of your network

Welcome to the seventeenth edition of the Standards Advisor. This report is issued quarterly and provides updates on the standards relevant to the structured cabling industry, and the impact they have on your network design, planning and operations.

This summary represents standards meetings held during the fourth quarter of 2017 and reports on activities from all aspects of the cabling industry. These activities range from the applications standards (IEEE 802.3 and 802.11 and T11—Fibre Channel) to the cabling standards (ANSI/TIA, ISO/IEC, CENELEC) and, finally, cover new developments in the world of multisource agreements (MSAs).

ISO/IEC JTC1/SC25 WG3: No meetings were held during Q4 2017

- The 3rd Edition of ISO/IEC 11801 “Information technology - Generic cabling for customer premises” was published on November 13, 2017, and includes the following six Parts:
 - ISO/IEC 11801-1 Part 1: General Requirements (in support of the other Parts in the series)
 - ISO/IEC 11801-2 Part 2: Office premises (together with Part 1, supersedes ISO/IEC 11801)
 - ISO/IEC 11801-3 Part 4: Industrial premises (together with Part 1, supersedes ISO/IEC 24702)
 - ISO/IEC 11801-4 Part 3: Single Tenant Homes (together with Part 1, supersedes ISO/IEC 15018)
 - ISO/IEC 11801-5 Part 5: Data Centers (together with Part 1, supersedes ISO/IEC 24764)
 - ISO/IEC 11801-6 Part 6: Distributed Building Services (new Standard, applicable to all premises)
- The 3rd Edition upgrades the minimum requirement for horizontal cabling in Offices to Class E/Category 6, and recommends deployment of Class EA/Cat 6A to support applications with data rates exceeding 1 Gigabit per second.
- The new standard also introduces OM5 multimode fiber with full backward compatibility to OM4 and support for short wave division (SWDM) multiplexing technologies.

The 64th ISO/IEC JTC1/SC25 WG3 meeting will be held 26th February to 2nd March 2018 in Paris, France

TIA TR-42: No meetings were held during Q4 2017

Updates on the agreed actions from previous meetings:

1. TIA TR-42.11 - Optical Fiber Systems

- ANSI/TIA-568.3-D addendum 1 closed first ballot. The draft received 85% approval response and 27 total comments that will be resolved at the upcoming meeting of TIA TR-42.11 at the end of January 2018.

2. TIA TR-42.12 – Fiber and Cable

- ANSI/TIA-598-D-2 OM5 lime jacket color
 - Issued second ballot at the ANSI level to close in time for comment resolution at the next meeting in January 2018. Comments on the first ballot indicated no dissention on the Lime color definition; the color is anticipated to be approved.

The next TIA TR-42 meeting will be held 29 January – 2 February 2018 in Orlando, FL

INCITS T11.2 Fibre Channel: Santa Rosa, CA USA, 4-8 December 2017

- Motion was passed to reduce the 64GFC backplane loss budget from 30dB to 25dB.
- Motion was passed to move latest version of FC-PI-7 document to T11 committee letter ballot.
- 53.125Gbs PAM4 eye diagrams were shown. Open eyes and TDECQ values are below 802.3cd specs.
- A new SFF-8472 compliance code was recommended to be added to the compliance code table.
- FC roadmap and strategy were studied, and business cases and trends were review for a 128GFC (serial/PAM4) project proposal.
- First draft of FC-PI-8 (128GFC/512GFC) project proposal was reviewed.

The next meeting of INCITS/T11 will be held 2-6 February 2018 in Fort Worth, TX USA

- The meeting focused on resolving comments and outstanding issues in the final draft of the revision to EN 50174-1 and -2. The document will now be prepared for final voting.
- For remote powering, CENELEC TC215 WG2 maintains its position to allow different choices:
 - a. a current per conductor of up to 500 mA over all conductors, resulting in support for remote power up to 90W on all cables, thus eliminating the need for additional documentation over the lifetime of the cabling
 - b. an average current per conductor over all conductors < 150 mA (with no conductor more than 500 mA), thus limiting the use to PoE and PoE+ applications with no additional planning over the lifetime of the cabling.
 - c. an average current per conductor over all conductors between 150 mA and 500 mA (with no conductor more than 500 mA), resulting in support for remote power up to 90W but with the need to calculate and document bundle load over the lifetime of the cabling.
- This approach allows new installations to be planned and existing installation to be assessed to meet needs for remote powering today and in the future with the lowest possible impact to the end user.
- All installations planned or assessed for the use of remote powering shall be labelled with planned power level.
- Cable heating test results were reviewed and discussed, several gaps in the understanding of the heating in different installation conditions were closed.
- Text to align EN 50174 with the CPR EuroClass was implemented.
- The outstanding issues of EMI performance of CMS and the reaction to fire for CMS including fiber micro ducts will be considered for a possible revision of the documents.

The next meeting of CENELEC TC215 WG2 will be held 11 April 2018 in Frankfurt, Germany

The next meeting of CENELEC TC215 WG1 will be held 12 April 2018 in Frankfurt, Germany.

1. IEEE 802.3bt 4 pair Power over Ethernet

- The IEEE 802.3bt 4-pair power over Ethernet Task Force completed the first round of the final stage of balloting, Sponsor ballot, and resolved comments. The Sponsor ballot is being recirculated. The document is technically complete and no new features are being added, but is still being revised to correct technical issues and improve editorial clarity; however, the scope of changes is being narrowed each cycle.
- The group now expects to complete Sponsor Balloting in the second quarter of 2018 and be approved by the IEEE standards board at or before the September 2018 meeting.
- One significant change was to add a warning to the draft against using narrower than 26AWG cabling with PoE. The caution will appear in the recirculation of the 802.3bt ballot coming out the meeting, but is subject to change in further rounds of balloting.
- The IEEE 802.3bt draft contains two new "Types" of PoE, Type 3 (up to 60W on 4 pairs) and Type 4 (up to 90W at the PSE) as well as updates to the existing specifications for PoE (802.3af and 802.3at are "Type 1" and "Type 2") to support new Ethernet rates of 2.5, 5 and 10Gbps, and currently references TIA TSB-184-A and ISO/IEC TR 29125 for cabling requirements. Additionally, the 802.3bt draft expands all Types of end-point PoE (PoE delivered from a switch) to support 10GBASE-T and the new 2.5G and 5GBASE-T speeds, and defines new midspan PSE variants for the new speeds as well.
- specifications.
- 2. Short-reach (15m+): The project also adopted link segment specifications for 15m point-to-point links, compatible with 25m multi-drop networks as well. Short reach PHYs are expected to optionally support multidrop.
- 3. An optional proposal to improve collision performance on multidrop networks (known as PLCA within the Task Force).
- 4. Optional single-pair powering, based on clause 104 (IEEE Std 802.3-2016, known as PoDL) with some specification changes and additional power levels.
- At the November meeting, the group adopted baselines for short reach, powering and autonegotiation, and issued a draft 1.0 for Task Force review. The group is on track for a technically complete draft in mid-2018 and standardization in 2H 2019. The inclusion of autonegotiation helps firm up the case for a single-pair ecosystem with multiple rates and reaches.
- The project is not expected to have a technically complete draft before Q2 2018.

3. IEEE 802.3 Backplane Ethernet Study Group

- A successful call-for-interest was held to convene a study group to recommend changes to the IEEE P802.3cg project documentation (PAR, Criteria for Standards Development, and Objectives) to including intra-system use cases. These would include applications within Ethernet Switches and Servers to convert existing proprietary connections to Ethernet. The study group is working in tandem with the IEEE P802.3cg Task Force and is targeting completion of its work at the March 2018 802 plenary.

4. IEEE 802.3ch Multigigabit Automotive Ethernet PHY Task Force

- This task force is focused on short-reach automotive links at rates of 2.5Gbps, 5Gbps, and 10Gbps. The objectives call for up to 15m and 4 connectors. The project is currently discussing media requirements primarily for 10 Gbps, and is converging on shielded cabling with bandwidths up to 6 GHz.
- The project includes use of the 802.3bu powering, but does not expect to extend that powering specification.

Single Twisted Pair Copper Standards

2. IEEE P802.3cg 10 Mbps Single-Twisted-Pair Ethernet

- The project objectives cover industrial, automotive, and building automation use cases, encompassing multiple different applications, one up to 15m, one of approximately 1km, and a new one is in formulation to reflect 25m multidrop applications. The project has organized around 2 physical layer specifications, and is developing text for them:
 1. Up to 1km single-pair: The project adopted baseline specifications for the up-to 1km process control and building automation application, adopting PAM 3 signaling and various electrical

5. IEEE 802.3bs - 400G and 200G on SM fiber

- IEEE 802.3bs completed balloting and was approved for publication. This Ethernet amendment specifies 200G and 400G fiber applications as shown in the following table.

PHY/PMD Name	Technology Combination	Reach (m)
200GBASE-DR4	50G/lane, 1310 nm parallel over 4 pairs of SM fiber	500
200GBASE-FR4	50G/lane, 1310 nm 4λ CWDM over 1 pair of SM fiber	2,000
200GBASE-LR4	50G/lane, 1310 nm 4λ LWDM over 1 pair of SM fiber	10,000
400GBASE-SR16	25G/lane, 850 nm parallel over 16 pairs of MM fiber	70/100/100 (OM3/4/5)
400GBASE-DR4	100G/lane, 1310 nm parallel over 4 pairs of SM fiber	500
400GBASE-FR8	50G/lane, 1310 nm 8λ LWDM over 1 pair of SM fiber	2,000
400GBASE-LR8	50G/lane, 1310 nm 8λ LWDM over 1 pair of SM fiber	10,000

6. IEEE 802.3cc - 400G and 200G on SM fiber

- IEEE 802.3cc was approved for publication, adding 25GBASE-LR and 25GBASE-ER to the list of 25 Gb/s Ethernet solutions.

PHY/PMD Name	Technology Combination	Reach (m)
25GBASE-LR	25G serial, 1310 nm over 1 pair of SM fiber	10,000
25GBASE-ER	25G serial, 1310 nm over 1 pair of SM fiber	40,000

7. IEEE 802.3cd - 50G, 100G, and 200G

- IEEE 802.3cd advanced to final stage (Sponsor) ballot. This draft Ethernet amendment specifies 50G, 100G, and 200G fiber applications as shown in the following table.

PHY/PMD Name	Technology Combination	Reach (m)
50GBASE-SR	50G serial, 850 nm over 1 pair of MM fiber	70/100/100 (OM3/4/5)
50GBASE-FR	50G serial, 1310 nm over 1 pair of SM fiber	2,000
50GBASE-LR	50G serial, 1310 nm over 1 pair of SM fiber	10,000
100GBASE-SR2	50G/lane, 850 nm parallel over 2 pairs of MM fiber	70/100/100 (OM3/4/5)
100GBASE-DR	100G serial, 1310 nm over 1 pair of SM fiber	500
200GBASE-SR4	50G/lane, 850 nm parallel over 4 pairs of MM fiber	70/100/100 (OM3/4/5)

8. IEEE 802.3 Study Group for “Beyond 10km Optical PHYs for 50G, 200G, and 400G Ethernet”

- IEEE 802.3 Study Group for reaches greater than 10 km collected input on preferences for reach and technology at 50G, 200G and 400G. Reaches of 40 km and 80 km received the most attention. Technology options include conventional direct detection and, for the first time, coherent detection. 100G was added to the scope in November.

9. IEEE 802.3 Study Group for “100Gb/s electrical signaling”

- IEEE 802.3 initiated a Study Group for 100Gb/s serial electrical signaling. The scope includes circuit board traces, backplane and copper cabling (twinax).

10. IEEE 802.3 Study Group for “200Gb/s and 400Gb/s over fewer MM fiber pairs”

- IEEE 802.3 initiated a Study Group for 200Gb/s and 400Gb/s over fewer MM fiber pairs. The likely technologies to be employed are short wavelength multiplexing (SWDM) and PAM4 signaling at 50G/lane. Currently 200G is being defined over 4 pairs (in P802.3cd) and 400G is defined over 16 pairs (in 802.3bs), so likely target fewer-pair solutions are 200G over 1 pair using 4 wavelengths (200G-SR1.4) and 400G over 4 pairs using 2 wavelengths (400G-SR4.2).

The next IEEE 802.3 meeting will be held 22 - 26 November 2018 in Geneva, Switzerland (IEEE 802.3 WG interim)



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